Exhibit B

IN THE COURT OF COMMON PLEAS
PHILADELPHIA COUNTY, PENNSYLVANIA

JACKIE L. SULLIVAN, Executrix of the Estate of JOHN L. SULLIVAN, deceased, and widow in her own right 304 Woodway Drive Lynchburg, VA 24501 Plaintiffs, vs. A.W. CHESTERTON, INC. (127), et al, 860 Salem Street Groveland, MA 01834 Defendants.	July 25, 2018

DECLARATION OF REAR ADMIRAL DAVID P. SARGENT, JR.

I, DAVID P. SARGENT, JR, being duly sworn, do depose and state under the penalties of perjury, as follows:

Background and Experience

1. I am a retired Rear Admiral of the United States Navy, in which I served between 1967 and 1999. I began my active naval career in 1967 after receiving a Bachelor of Science degree in Mechanical Engineering from Cornell University and receiving a commission in the Navy through the Naval ROTC program. Upon commissioning in the Navy, I attended the Cruiser-Destroyer Forces Pacific Fleet Engineering Officer's School in a course focused on the operation and maintenance of engineering plants of World War II era steam propulsion warships. In 1974, I received a Master of Mechanical Engineering degree from the Naval Postgraduate School, Monterey, California. In addition, I am a licensed Professional Engineer (Mechanical) with extensive operational experience in ship engineering, ship maintenance and at-sea operations, and I am a Navy Certified Acquisition Professional.

2. My assignments from 1967 until 1988 were primarily involved with the operation and maintenance of Navy warships. Thereafter, I held a variety of program and technical management positions in the Naval Sea Systems Command program offices where I was responsible for the design, construction, fleet introduction, in-service support, and modernization of various classes of warships. Upon selection to Rear Admiral in 1994, I was assigned as Commander, Naval Surface Warfare Center, a diverse organization of research laboratories and engineering stations responsible for research and development of all technical aspects of Navy surface ships and submarines. My final assignment before retirement in October 1999 was as Program Executive Officer (PEO) for Aircraft Carriers, Expeditionary Warfare and Auxiliary ships. In that position, I had overall responsibility for all matters relating to both the technical and programmatic details of design, construction, delivery and support of both new and in-service aircraft carriers, expeditionary warfare and auxiliary ships of the Navy.

3. I am now the President of Sargent Enterprises, Inc. which includes several business units: SEI Associates, a consulting business that provides technical and management advice to marine industries; SEI Marine Technologies LLC; a currently inactive company that operates and maintains various test and demonstration craft for R&D companies involved in developing new equipment and hull forms for future high performance ships, SEI Vistas LLC, SEI Properties LLC and SEI Skyland LLC which are business unit involved in the management and renovation of rental properties, I have served for many years in active leadership of the American Society of Naval Engineers (ASNE) and in 2001 was elected to serve as President ASNE, and served two consecutive two-year terms. I continue as an active member of ASNE leadership. I am also a member of the Sigma Xi Engineering Honorary Society, the American Society of Mechanical Engineers, The Cornell Engineering Alumni Association, the U.S. Navy League and several other professional societies.

4. I understand that John L. Sullivan served on active duty in the Navy from approximately October 1967 until February 1972 and again from January 1973 until January

1980. I understand that he became a Navy Machinist's Mate and served in six or more US Navy ships that were steam turbine propelled.

5. I have been asked in this case to summarize the military environment on Navy warships, Navy organization, responsibilities, ship design and acquisition processes and related documentation, and the use of asbestos on Navy ships as these subjects relate to both shipyards that the Navy contracted to construct Navy ships and to manufacturers of equipment that the Navy procured for installation in Navy ships.

6. I have also been asked to summarize how the Navy manages the procurement, warehousing, distribution, issue and replenishment of the vast array of material and items required to operate, maintain and repair the Fleet of complex warships. Details of the Navy supply system can be found in multiple books such as Supply Rate Training Manuals (SK, DK, SH, etc.), the Naval Supply Systems Command Manual, and many others. My intent in this affidavit is to summarize the Navy supply system at a high level as I have experienced it from my own Navy education, training and experience. I will emphasize aspects that relate to the procurement of replacement of consumables such as gaskets and packing in equipment installed on Navy ships and how the Navy Supply System processes were the key in supplying lifetime support of both replacement repair parts and consumable products to both uniformed shipboard personnel and shipyard personnel involved in overhaul and repair of Navy warships and installed equipment.

The Military Environment on Navy Warships is Unique

7. The military setting on Navy ships is unique and distinct from the civilian environment, and also differs somewhat from that of land based military organizations. All have management structures, but the military command hierarchy of rank is well defined and the accountability and authority of the Navy ship's Commanding Officer approaches absolute. This authority is based in Federal statute, as well as in Navy Regulations and Instruction. Over time, there have been evolutionary changes in these to incorporate changing societal values, but the authority of the individual in command remains constant. When routine "orders" are given,

prompt and appropriate response is expected. The failure to obey a lawful order is a punishable offense and, depending upon the situation (wartime, national emergency, misconduct), the punishment can be severe. Individual freedoms that are common to civilians are not as universally applied to military members. Civil liberties indeed exist, but they are tempered to the strict Uniform Code of Military Justice (UCMJ) and the requirements of individuals serving in the Country's national defense. Military personnel are required to wear uniforms with rank insignia, and to maintain strict physical and grooming standards. Military members ask for permission to leave the presence of a senior in a normal setting, and juniors initiate salutes when in uniform. Although the actual work tasks and duties performed by Navy sailors may be similar to some civilian trades, naval uniformed personnel are not civilians "doing their job".

8. The normal day in the military also differs dramatically from the civilian environment. Whereas civilians have a "normal work day" of 8 or so hours and then return to their "private life", in the military the "work day" is 24 hours long. Here again that 24 hour day is unique for Navy personnel on ships for several reasons. First, a warship is the only weapons system in which the operators live. Armies live in barracks or tents, store their weapons in ammo magazines, and conduct their daily military tasks in locations separate from both of those. On Navy ships, the ship is the "barracks", the "magazine, the "weapon", and the military "work site", and is continuously in motion on the oceans of the world. Thus, sailors on a Navy ship must continuously operate the ship's propulsion system and "hotel services" equipment that make the ship safe and livable, but must also spend a "military work day" focused on training and maintenance of the "weapon systems" to be battle ready. These two requirements are done concurrently on ships through a "watch bill" in which personnel operate the ships on a twenty-four hour basis, and a "work day" of approximately eight hours. The "watch bill" is typically comprised of four hour "watches" during which the "engineers" operate the propulsion, electrical generating, and other systems that make the ship mobile, safe and livable, the ship's officers and "deck force" stand navigation and ship control watches on the bridge, and the "operations crew"

continuously operate the ships radars, communications, and other electronics equipment. There are typically three "watch sections", thus allowing the personnel to be "on watch" for four hours, and "off watch" for eight hours. Those watch sections in an "off watch" status during the daylight hours use that time to accomplish the "military work day" focused on training and readiness of the war fighting equipment. Thus, a typical day for a sailor on a Navy ship includes two four hour "watches" and up to eight hours of "military work". In addition to the concurrent "watches" and "military work", a Navy ship typically conducts "underway replenishment" every three or four days. During these "underway replenishments", warships rendezvous in close formation with Navy oilers, ammunition ships, and food cargo ships and transfer large quantities of fuel, ammunition, and food to that are needed to keep the ship operating and battle ready. These "underway replenishments" typically take three to four hours to complete, and require "all hands" to be involved to operate the special equipment and to handle the food, ammunition, and cargo coming aboard. These "underway replenishments" can occur at any time of the day, and are often done in the middle of the night. Therefore, a Navy sailors' "typical work day" is very busy with "watches", "work", and "special evolutions" such as replenishment.

Navy Warships are Unique and Complex

9. Warships must be designed to meet very demanding performance requirements such as high speed and firing of weapons, the ability to safely carry and employ a vast array of explosives and ammunition, the ability to operate for long periods at sea without support or replenishment, and do all these missions both in peacetime and in combat.

10. Navy warships are some of the most complex machines ever designed and constructed. They are high-speed, floating, heavily armed communities that must support hundreds of crew members and a vast array of complex systems for months at sea. Ships are the only machines sufficiently large, complex and mobile that the operators must live inside the machines they operate. Thus, warships of all sizes and types contain all the facilities of a community plus multiple armaments and ammunition. Major characteristics and capabilities

include a sturdy and survivable hull form, high performance propulsion systems, electrical power generation to support all needs, fresh water distilling systems, food storage, preparation, and eating spaces as well as clean up, living spaces, laundry services, medical spaces, library, firefighting and damage control capabilities, and many other services.

11. An example will help to illustrate the immense task faced by the Navy in designing warships. Among the vessels constructed by the Navy during the general period in question were the so-called *FORRESTAL* class aircraft carriers. These ships were designed and constructed during the 1950s and served the Navy into the 1990s.

12. The *FORRESTAL* class carriers were 1,063 feet long, with an extreme width of 252 feet. They displaced about 80,000 tons. Their draft, or depth below the waterline, was approximately 37 feet (about the height of a 4 story building). The overall height of the ships was greater than the height of a 25 story building, and they had 19 different "levels" or floors. The flight deck from which aircraft took off and landed was approximately four acres in size, and the hangar bay consumed an additional two acres. The vessels had approximately 3,000 separate compartments or rooms, ranging in size from small offices to engineering spaces the size of gymnasiums. The onboard storerooms were equal in size to a six-story building. It took about 300,000 gallons of paint to paint the entire ship. There were multiple large food preparation and serving areas to feed the crew around the clock.

13. The *FORRESTAL* class carriers were capable of speeds in excess of 30 knots (about 36 mph), produced more than 200,000 gallons of fresh water a day by distilling salt water, and carried several hundred-thousand gallons of ship and aviation fuel. Each had eight large turbo-generators that produced enough electricity to power a good sized city. The Navy estimates that the ships had more than 10,000 miles of electrical cable installed and many miles of piping the ships carried more than 80 aircraft each, and they had crews of more than 5,500.

14. Navy warships must be designed to operate effectively in very harsh and hostile environments, to survive battle damage and fight again, and to meet demanding speed and maneuvering requirements. Over time, the specific types of enemies, weapons and combat

which Navy ships must face has changed, from a focus on surface-to-surface combat involving heavy guns to greater use of aircraft and missiles. These changes have created fundamental changes in the design and construction of Navy vessels.

15. Beginning in and following World War II, the aircraft carrier became the most significant type of surface ship. An aircraft carrier must use high speed to create wind over the deck to launch and recover aircraft. The result was an overall increase in the speed demanded of Navy vessels of all types, whether carriers or the support and escort vessels that accompany them. To meet these demands, Navy designers had to develop significantly higher horsepower propulsion plants. It was also imperative that this increased power be achieved without significant increase in either the size or the weight of the propulsion plant, since increased size and weight would require even more horsepower.

16. The unique aspects of Navy warship design and development placed other requirements on the Navy establishment. Since there was no U.S. industry that either designed or assembled these high performance steam propulsion plants, the Navy had to undertake itself the design of these complex and state-of-the-art warships, and had to develop ways to verify the performance and reliability of these new designs. To accomplish this, the Navy maintained an engineering establishment with many different engineering specialties. The Navy had the most diverse and advanced engineering workforce in the nation. Additionally, verifying the performance of these new propulsion designs required that the Navy engineering organization build large shore-based laboratories in which they assembled and operated prototypes of these propulsion plants. These prototypes served many uses including verifying performance, validating reliability, and developing optimum operating procedures.

Navy Vessels - Concept to Operational- The Process

Cost and Feasibility Studies

17. Prior to the 1940s through the 1970s, the design of Navy warships started with the establishment of naval war fighting requirements at the national level. Examples included requirements such as the need to ensure that sea lanes in international waters cannot be denied by an enemy, the need to detect and neutralize hostile ships, submarines, and aircraft that might threaten U.S. or allied coasts, the need to transport and operate aircraft near enemy territory, and the need to transport and debark Marines anywhere in the world. From requirements such as these, various ship concepts were formulated.

18. Rigorous feasibility studies were done on these concepts by both seasoned naval operators and by experienced ship engineers and designers to validate and mature the concepts, and to develop initial cost estimates for budgeting and congressional funding requests. A final ship concept design emerged, describing such parameters as approximate physical size and displacement of the ship, what weapons and sensors would be used aboard, what speed it was required to achieve, what range it must be able to achieve without refueling, and how long it must operate at sea without replenishment. Typically, it took a year or more to progress from a defined new warship requirement set to an agreed to concept design to meet those requirements.

Preliminary Design

19. The next step in the creation of a new warship during the time periods in question was the conversion of the concept design into a preliminary design package that contained sufficient details of the structure and all ships systems to allow engineers to verify that the ship would meet established requirements. During preliminary design Navy engineers determined all equipment arrangements, the weight and stability of the ship, a detailed understanding of the ship's displacement and powering requirements, and a much better cost estimate. Work included investigation of details such as identification of what materials and technologies existed or could

be developed in time to achieve the performance of each system, and ensuring that these technologies and design details could in fact be manufactured and integrated into a completed warship.

20. The preliminary design phase was accomplished by dividing the very complex ship into many groupings and sub-groupings such as hull design, propulsion, electrical, deck equipment, messing and berthing, medical, navigation, weapons, sensors, and auxiliary systems to name just a few. During this preliminary design phase, engineers had to develop and document the performance, configuration, and location of each system and piece of equipment that is required to meet the overall ship performance requirements.

21. The preliminary design also had to comply fully with extensive Navy warship design General Specifications and other design guidance developed over many decades of experience. Examples include aspects such as how much damage the ship must be able to experience and still remain operable, what levels of shock from battle damage equipment must withstand and remain operational, and what firefighting and damage control capabilities must be included in the design. At the completion of the preliminary design and related documentation, the Navy was confident that the ship and all included systems and equipment would function as designed and would meet the war fighting requirements.

22. Although the time to develop a preliminary design varied greatly depending on the size and complexity of the warship, typically for a destroyer-type warship, the preliminary design required six months to a year and thousands of man-years of engineering work.

<u>Development of the Contract Design package</u>

23. The next phase in progressing from a ship design to an operational warship was the contract design process, in which the preliminary designs were converted into documentation of proper format and sufficient details for use in the government acquisition contracting process. In essence, this effort was to "design" the procurement contract.

24. The complex ship systems and subsystems described in the preliminary design were typically comprised of a myriad of individual mechanical and electrical components connected together in intricate ways. During the contract design phase, Navy engineers had to confirm that sources exist from which the specified materials, equipment, and consumables could be obtained. However, usually there was no one source from which the Navy could obtain these complex warship systems and subsystems. Rather, sources had to be identified for individual components that can later be assembled into the Navy's complete systems. Thus, the Navy typically had to procure, for each vessel, countless individual components from dozens of individual suppliers and sources. Examples of components associated with just the propulsion systems on Navy warships include specific types of steel and fasteners, pipe and fittings; valves, pumps, turbines, condensers; electrical motors, generators, and switchboards; gauges, meters, alarms; boilers, condensers and reduction gears. During World War II and well into the 1960s, virtually all equipment that was to be installed in warships was procured by the Navy and provided to the building shipyard as government-furnished equipment.

25. This detailed design of all equipment, subsystems, systems, and the entire ship had to fully comply with a plethora of Navy design guidance developed from previous experience. For example, the Navy set and followed internal standards and requirements regarding such matters as levels of redundancy necessary to preclude single points of failure, standardization of consumables and spare parts amongst different equipment and systems, and across warship classes, crew operating environmental requirements such as temperature, noise, lighting, equipment labeling, standard Navy identification and labeling of decks, doorways, compartments, and equipment, and housekeeping matters such as heating and ventilation, food storage preparation and serving, and laundry requirements.

26. The contract design package when complete included the entire set of Ship Specifications with detailed design information, the contract plan for procuring all equipment as well as contracting for ship construction, and the multitude of individual requests for proposals that were required to describe every piece of material, equipment and subsystem that had to be

procured to allow construction of the warship. The development of the contract design package involved multiple government decisions. Examples include decisions which were subject to various Navy and other federal guidance and regulations, such as Federal Specifications, Federal Acquisition Regulations and Defense Federal Acquisition Regulations.

27. The Navy developed specifications called, since the 1950s, Military Specifications (MILSPECs) for use in the contract design package. Thousands of MILSPECs were developed for various specific materials, equipment, components, books, manuals, label plates, etc. These MILSPECs presented very detailed descriptions of what the government required when procuring the items covered by the MILSPECs, including requirements such as chemical composition, dimensions, required testing and performance demonstrations, required labeling, packaging and shipping requirements, and similar content. These specifications typically cross-referenced and invoked other specifications.

28. The Navy maintained the responsibility to develop the MILSPECs and other standards for the manufacture and supply of equipment used in the construction, maintenance and repair of Navy ships. Specifications for any equipment intended for use aboard Navy ships were drafted, approved and maintained by the Navy. Once promulgated, only the Navy could make changes or modifications to those specifications. MILSPECs were prepared by hundreds of Navy engineers highly qualified in specialty areas such as, among many other things, valves, pumps, steam turbines, gas turbines, reduction gears, ship propulsion, and auxiliary equipment.

29. This specification system was initiated in the 1930s and was expanded in both scope and detail for use in the procurement of the large number of complex warships procured in the World War II timeframe and since. The technical specifications system always included a disciplined revision and change process to ensure technical specifications were kept current and reflected changing requirements, technology, materials, and other related updates. Manufacturers of components, such as valves and pumps, procured by the Navy for use in warships were required to comply with technical specifications in all details in order for the Navy to accept the equipment being manufactured, tested, and shipped.

30. Navy specifications for various types of equipment were communicated to vendors when the Navy (or private entities, such as shipyards or design professional firms) issued Requests for Proposal (formerly called Invitations for Bid) for the manufacture or supply of certain equipment. Compliance with the standards and specifications issued for equipment supplied for ultimate use aboard Navy ships was directly monitored by Naval Machinery Inspectors under both of the following divisions: (a) Machinery Inspectors under the Bureau of Supplies and Accounts worked on-site at vendors' facilities, and (b) Machinery Inspectors under BUSHIPS carried out their responsibilities at the shipbuilding yards. The Machinery Inspectors ultimately worked for the Secretary of the Navy or the Secretary of War. These Inspectors exercised primary, front line control and direction over the work performed for the Navy by original equipment manufacturers (OEMs), regardless of whether the equipment was being constructed or supplied pursuant to a Navy or private contract. The Navy required in process testing and approval. For example, shock testing, balance testing, vibration testing, tolerance measurements, endurance testing, radiographic testing, etc., were reviewed at the manufacturer's facility and approved by the Machinery Inspectors before the equipment was shipped. Compliance with the testing requirements necessitated unique design and engineering to ensure the necessary strength and durability of the equipment for battle conditions. Equipment could not have been installed aboard Navy vessels unless it was first determined by the Navy to be in conformity with all applicable Navy specifications. The Navy required equipment manufacturers to supply drawings and plans, which the Navy would approve and sometimes revise or comment on before equipment was constructed and shipped.

31. The incredible level of detail contained in these specifications is necessary to ensure complete and common understanding between the government and vendors of what it is the government is requiring and is committing to pay for, to ensure commonality across systems with similar components, and ensure that replacement parts, equipment and consumable materials, some provided by different manufacturers, will all perform as desired. An acquisition contract typically invokes many different MILSPECs, various technical documents such as

drawings prepared by the Navy's Bureau of Ships. Taken together, the contract and the incorporated materials present all details of what the Navy requires. It is through this detailed acquisition process that misunderstanding, or rejection at the time of government acceptance inspection, is avoided. This process also minimizes contract disputes between the government and industry vendors.

32. Developing the contract design package is comparable to the effort required if a team was to simultaneously develop the detailed designs and contracts to construct a small city including all the required services such as utilities, hospitals, restaurants, and the like. Because of the complexity and thoroughness required, development of the contract design package for a warship such as a destroyer typically took two years or more to complete, with thousands of man-years or effort from engineers, logisticians, contract and legal specialists.

Detailed Design

33. From the 1940s through the 1970s, the next step in the creation of a new warship was the conversion of the contract design into detailed design package that contains sufficient details of the structure and all ships systems to allow the building shipyard to build the ship and integrate all specified equipment in accordance with Navy requirements and specifications. The detailed design was typically accomplished by the construction shipyard - whether a Navy yard or a private yard after the construction contract was awarded. During this detailed design phase, engineers had to develop and document in detail the exact location, mounting details, and interface details of each system and piece of equipment in the total ship. Even where not performed by Navy personnel, the detailed design was also overseen by Navy representatives. Pursuant to those design plans and specifications, the shipyard connected an array of components such as valves, pumps, boilers, turbines, generators, and other equipment to pipes by adding gaskets to the flanges of each piece of equipment and piping. Where flange gaskets contained asbestos, it was because the Navy required it; the manufacturers of valves and pumps did not manufacture or supply the flange gaskets.

Warship Construction

34. The final phases in getting the warship operational included the construction, testing and trials, and acceptance by the Navy. During World War II and up until at least the mid-1960s, some Navy warships were constructed at Naval Shipyards and others were constructed at private shipyards under Navy contract and Navy supervision. Once the Navy selected a construction shipyard, that shipyard was required to comply with all details of the contract in the procurement of material and equipment, the construction of the ship, the testing of equipment, subsystems, and systems and the demonstration to the government that all systems functioned properly. All construction and testing was overseen on a daily basis by the on-site Navy Supervisor of Shipbuilding (SUPSHIP) team. Formal acceptance of the completed warship was recommended by the Navy Board of Inspection and Survey only after the members of the Board had witnessed successful sea trials of all systems.

35. Private shipyards such as Newport News Shipbuilding and Dry Dock Company (NNS&DD) and Avondale Shipyard (ASY) when contracted by the Navy to do the construction of Navy ships were essentially functioning as a Naval Shipyard in that role. The Navy contracts with the shipyard specified in great detail all the materials, processes and testing that was required by invoking numerous Navy or Military Specifications and Standards, and the work was overseen continuously by the onsite Navy SUPSHIP commander and staff. Shipyards such as NNS&DD and ASY could not vary from those detailed specifications and standards in any way without the express approval of the Navy and a modification to the contract documenting that approved change.

36. Shipyards that build Navy ships, both public naval shipyards and private shipyards such as NNS&DD and ASY, in addition to constructing the ship to detailed Navy specifications and standards and installing equipment manufactured by other industries, also manufactured many items that were installed in these ships such as messing and berthing equipment, work benches, storage cabinets and many other components. All of these items

manufactured by the constructing shipyard were also manufactured and installed in accordance with detailed Navy specifications.

37. Construction of even a relatively small warship such as a destroyer typically took three to five years, with larger ships requiring somewhat longer. During World War II, the construction time for warships was dramatically reduced through the concerted efforts of both the Navy and the industries involved. The Navy, working with the War Production Board, instituted standardization of warship designs, central procurement of ships' major equipment, propulsion machinery, and ordnance, and allocation of key materials. Industry went to twenty-four hour workdays with multiple shifts, prefabrication and automation of many processes, and multiple other time saving methodologies. The Navy and the U.S. Maritime Commission worked closely with the shipbuilding industries and increased the number of shipyards capable of constructing destroyers and larger ships from approximately a dozen in 1940 to around 70 in about two years.

Asbestos and Insulation in the Navy

38. As described above, the Navy requirements for aircraft carriers and other warships of World War II and later included the need for significantly higher speeds than previously. This high speed required was achieved by the design and development of sophisticated high-pressure steam propulsion systems. Steam pressures of 600 pounds per square inch and the ability to superheat the steam to 850 degrees F became the norm.

39. The key to meeting this high horsepower demand was the development by the Navy of much high pressure, superheated steam propulsion plants. With the increased pressures came greatly increased temperatures and thus the need for much improved insulation technologies, both for plant efficiency and for operator comfort and safety. These "high power density" propulsion plants increased the operating temperatures of machinery and piping, and they created a need for greatly improved thermal insulating and lagging materials. The Navy maintained significant expertise in the important areas of heat transfer and insulation. As a

consequence, the thermal insulation needs associated with various equipment and systems was a significant issue in the design of Navy vessels from a number of perspectives. Thermal insulation served a number of important functions, as set forth, for example, by the 1947 version of the Navy's BUSHIPS Manual, a technical reference for Navy engineers, where Chapter 39 was devoted entirely to "Thermal Insulation":

39-2. REASONS FOR INSULATING

(l) In every power plant there is a heat loss from all heated surfaces and a heat fl ow to all cooled surfaces. Heat fl0w may occur in three ways; by conduction, by convection, and by radiation.

(2) Conduction is the heat fl0w from one part of a body to another part of the same body, or from one body to another with which it is in physical contact, without displacement of the particles of the body. This manner of heat fl 0w is most important in insulation as it is the low conduction which results in the greatest temperature differential between a hot insulated surface and the atmosphere (as in steam piping insulation), or the relatively warm atmosphere and a cold surface (as in refrigerating plant insulation). Heat transfer from insulated pipes or large blanketed or cemented surfaces (turbines, evaporators, etc.) to the outer surface of their lagging is included in this mode. Conduction is associated with solids and comparison of materials in this respect is measured by a factor called the "thermal conductivity" which expresses rate of conductivity in British thermal units (B.t.u.) per inch of thickness per hour per square foot of area per degree Fahrenheit temperature differential.

(3) Convection is the transfer of heat from one point to another within a fluid, gas or liquid, by circulating or mixing of one portion of the fluid with another. These currents are produced by warm fluid being displaced by heavier cold fluid. It is of interest to note that convection reduces the effectiveness of air space insulation unless such space is very small.

(4) Radiation is the method of heat transfer by which a hot body gives off energy in the form of radiant heat which is emitted in all directions. Radiant heat, like light, travels in straight lines and with the speed of light. The surface condition greatly affects the ability of a body to radiate heat. Dull, dark, rough finished surfaces are the best radiators. Conversely, bright, shiny, smooth surfaces are good heat reflectors.

(5) In order to minimize the transfer of heat from or to a body or surface which is hotter or colder, respectively, than the surrounding atmosphere,

> thermal insulation is applied. This thermal insulation is a material or materials of low thermal conductivity. (See par. 39-2 (2).) While increasing the economy of the plant, thermal insulation also reduces the quantity of air necessary for ventilating and cooling requirements and prevents injury of personnel due to burns from contact with hot parts of apparatus. It also insures more uniform heat distribution within equipment. Another function of thermal insulation is to prevent "sweating" of cold surfaces on which atmospheric moisture condenses thus causing undesirable dripping as well as accelerated corrosion of the metal. Insulation must be sufficiently effective to reduce heat losses and lower surface temperatures to a degree which will permit habitable conditions in a specific space or compartment.

(Exhibit A, 39-2).

40. Due to the importance of heat transfer and insulation in Navy propulsion plants and aboard Navy vessels more generally, the Navy maintained significant expertise in these areas. The BUSHIPS manual and other documents issued and continuously updated by the Navy contained detailed instructions for the insulation by Navy shipyards or private contractors of various systems and equipment, including, primarily, the miles of piping associated with thermal systems aboard vessels. The Navy's specifications provided detailed instructions as to the specific insulating materials to be used, and also as to the amounts of those materials and the manner in which they were to be applied.

41. 38. A 1946 article entitled "A Health Survey of Pipe Covering Operations in Constructing Naval Vessels" summarized the extent of and reasons for the Navy's use of asbestos-containing insulation during World War II:

> The chief reasons for the wide use of amosite felt and pipe covering in naval work are its low thermal conductivity, light weight, strength, and refractoriness. When the felt and pipe cover were first developed, we were still building vessels under the Washington Treaty of Limitations in Tonnage, and every pound saved meant that much more armor, guns or ammunition for a given displacement, to say nothing of more economic operation for the weight involved in insulation.
>
> Amosite pipe covering weighs about 14 pounds per cubic foot, with a temperature limit of 750 degrees F. as compared to magnesia with a weight of 16 pounds per cubic foot[....]
>
> The development of amosite felt started in 1934 when a need existed to secure a thermal insulation lighter in weight and thermally more efficient than the

> materials (blocks and cement or asbestos blankets) which were then being used in destroyer turbines.... Originally amosite was used only for turbine insulation, but it proved so satisfactory that its field of application enlarged to include insulation of valves, fittings, flanges, etc. From the initial destroyer, it has been used on almost all the destroyers built since that time and on all other combat vessels built since before the War.
>
> Pipe covering was a later development in late 1935 and early 1936. Due to the manufacturing problems involved, it took a longer time to evolve into a satisfactory shape, and its first use on naval vessels was in 1937. Since that time its use has spread markedly and it was used on the great majority of naval combat vessels built during World War II.

(Exhibit B, p. 9).

42. The Navy's dictation of the methods and materials for insulation of thermal systems took various forms. As noted above, these included serial iterations of the BUSHIPS Manual's Chapter 39 on "Thermal Insulation." See Exhibits A (1947) and C (1959). The Navy also prepared and imposed upon Navy design engineers General Specifications for Machinery for Vessels of the United States Navy. Those specifications included an entire section - Section S39 - governing "Thermal Insulation for Machinery and Piping." The 1951 version of this document is attached as Exhibit D. Beginning in 1962, the Navy began issuing a Military Standard (MIL-STD-769) intended "to amplify the general requirements for insulation of piping, machinery, uptakes, and mechanical equipment covered in the General Specifications for Ships of the U.S. Navy or in ships specifications. (Exhibit E).

43. The Navy and/or its design agents prepared for the builders of Navy ships detailed drawings and plans showing the precise methods and materials for insulation of various systems and equipment. Those documents - referred to as "Insulation and Lagging Schedules" - implemented the overall requirements of the General Specifications and they provided the actual instructions to the personnel applying insulation as part of an integrated system of temperature control and energy conservation consistent with the Navy's needs in the operation of its ships. These plans are referred to as "Insulation and Lagging Schedules." They were typically developed for each class of warship. Examples of such plans for the *USS Fletcher* and *USS Sumner/Gearing* class destroyers and the *USS Essex* class aircraft carriers are attached as

Exhibits F, G, and H. The Insulation and Lagging Schedules included details on the materials to be used, the thickness, installation procedures, and finishing details for tens or even hundreds of tons of thermal insulation materials to be applied by Navy and private shipyards. Once the Navy selected a construction shipyard, that shipyard was required to comply strictly with all Navy specifications, plans and drawings in the application of insulation and lagging to systems and equipment aboard Navy vessels.

44. As the attached documents demonstrate, throughout World War II and post-World War II era, the vast majority of thermal insulating materials used aboard Navy vessels contained asbestos. Asbestos-containing materials offered many advantages over previous or alternative materials in meeting these needs. They were relatively light compared with previous materials, had better insulating properties, did not require excessive thicknesses in application, were more durable and were resistant to dissolving in or absorbing salt water. The materials also served as fire protection in an environment in which fires were an ever-present danger.

45. Thus, the use of asbestos in thermal insulation allowed the Navy to design and field propulsion systems that met the demanding war fighting requirements of World War II and later. The importance of asbestos to Navy warships is attested to by the fact that it was assigned a high priority in the U.S. government's critical materials allocation process. Asbestos was in short supply during World War II, and its use was controlled through the War Production Board process. A very large percentage of asbestos was allocated to the needs of the Navy and U.S. Maritime Commission for use in insulation for ship construction.

46. The Navy's demands for asbestos-containing insulation were extraordinary. For example, the Insulation and Lagging schedules for destroyers of the Navy's *Sumner* and *Gearing* classes - relatively small vessels of which the Navy constructed approximately 200 during World War II - specified nearly 24 tons of asbestos containing thermal insulation be installed. A 1979 Department of the Navy letter (Exhibit I) recites the following estimates of the quantities of asbestos containing thermal insulation aboard different types of Navy vessels of the 1950s and 1960s:

Destroyer – DD	87,634lbs
Guided Missile Cruiser – CGN	123,770lbs
Submarine – SSN	62,465lbs
Replenishment Oiler – AOR	78,515lbs
Large Harbor Tug – YTB	6,858lbs

Larger vessels, such as aircraft carriers and battleships, required multiples of those amounts. Taken as a whole, in both new construction and overhaul, the Navy applied thousands of tons of asbestos containing thermal insulation and other materials aboard its vessels from the 1930s through the 1970s.

47. Due to the complexities of the ship design and construction process, and the global nature of the Navy's approach to selection and procurement of insulation and lagging materials, manufacturers of components were not consulted by the Navy with respect to insulation of their equipment. Moreover, they had no control over the types and quantities of insulation products to be used in conjunction with their equipment, nor could they even be certain whether or not any insulation would, in fact, be applied to their equipment due to the variety of circumstances and potential uses of the original equipment once aboard a Navy vessel.

48. Above and beyond the tens or hundreds of tons of thermal insulation used, other asbestos materials were ubiquitous aboard Navy vessels pursuant to Navy specifications and requirements. These materials included electrical insulating materials, flooring, refractories and sealing materials.

49. Shipyards, both public Naval Shipyards and private shipyards such as NNS&DD and ASY were required to use exactly the materials, both asbestos containing and non-asbestos containing, specified by the Navy in the shipbuilding contract and could not vary from those detailed requirements without prior approval from the Navy and a modification to the contract documenting any approved variation from the original contract.

50. Navy warships are sophisticated "mobile communities" outfitted with a vast array of complex equipment and manned by a crew of operators comprised of brand new recruits with

no experience to seasoned senior technical professionals. In order to ensure effective, efficient and safe operation of its warships, the Navy, since at least World War II, has developed and maintained extensive documentation for each ship class and individual ship. This extensive "library" of documentation consists of different major categories of subjects such as Organizational Regulations and Policy, Tactical, Technical, Administration, Logistics, and Training to name just a few. The intended audience and purpose of a document differs amongst categories and documents within those categories. Some documentation contains information relevant to the entire crew or ship while other documents address more focused subjects such as a ship department, a specific technical rating or an individual piece of equipment. Understanding the specific Navy objectives of different categories of documentation is helpful in understanding the required content and level of detail that the Navy specified to be included. Of particular relevance to shipboard operators of equipment are the categories of Training and Technical documentation.

Navy Shipboard Training Documentation

51. Shipboard training of Navy personnel consists of both individual and team training and each category includes both technical and non-technical requirements. The Navy defines individual training as any training, including in-rate training, which improves a member's usefulness to his unit. Team training is defined as the training of groups of officers and enlisted members to work effectively together as teams in the engineering spaces, on the bridge, in damage control parties and similar team efforts. Technical requirements (sometimes referred to as Occupational Standards) include the specific knowledge expected of an individual in his or her specialty, rate and rating. Non-technical requirements (sometimes referred to as Naval Standards) include subjects such as general naval knowledge of discipline, Navy Regulations, Uniform Regulations, first aid, shipboard safety, and similar all-hands subjects.

52. Training documentation in support of individual and team, technical and non-technical training was developed under the directives of the Chief of Naval Operations and the

Chief of Naval Personnel. Examples of individual technical training documentation are the various Naval Personnel (NAVPERS) rate training manuals such as Machinist's Mate 3&2 and Boilerman 3&2 and similar manuals for all ratings. Examples of individual non-technical training documentation are the Military Requirements for Petty Officers 3&2 and General First Aid Manual. Damage Control and Engineering Casualty Control Exercise Drill outlines are examples of Navy-developed team training documentation.

53. Training documentation, both technical and non-technical, was developed by the Navy with specific focus on the skills, level of experience, education and advancement requirements of the individuals and groups for which it was developed. It was typically developed with content applicable to all Navy members of that group. Thus, technical rate training manuals included general information about equipment and systems as opposed to focusing on any specific make or model. Non-technical general training documentation included information and examples that were relevant to all Navy personnel whether stationed afloat or ashore. The ultimate use of Navy training documentation was, and is, to assist the Navy members to become as proficient as possible both in their rates and specific skills and as Navy leaders and managers.

Navy Shipboard Technical Documentation

54. Unlike Navy shipboard training documentation that is focused on training individuals and teams, Navy shipboard technical documentation is developed and provided as reference material that can be consulted if and when required in the operation, maintenance and repair of equipment and systems. Navy shipboard technical documentation includes various categories from high level Navy technical policy documents such as the Bureau of Ships Technical Manual to equipment specific documents such as BUSHIPS drawings/blue prints, system schematics, and troubleshooting manuals.

55. The Bureau of Ships Technical Manual (BSTM) was a multi-chapter manual that documented the Bureau of Ships-level technical policy and procedures developed and used by

BUSHIPS engineering and technical organizations in the design and life-cycle support of Navy ships and installed equipment.

56. Equipment specific technical documents such as BUSHIPS drawings and systems schematics contain information of sufficient detail to allow maintenance and repair of shipboard equipment by ship's force personnel while operating at sea and in remote areas where outside assistance is not available.

57. The Navy typically developed equipment operational guidance manuals for more complex equipment and systems. Typically, the Navy required these "instructional manuals" for equipment that required operator involvement in start-up, operation, and shutdown. Equipment that did not require operational steps, such as globe and gate valves, and equipment that operated "passively", without operator involvement, such as steam traps and check valves, would typically not require a "technical or instructional manual". Examples include equipment level Technical Manuals (sometimes called Instruction Books) and system-level manuals such as the DD-445/692 Classes Main Propulsion Plant Operations Manual.

58. The Navy identified a need and developed standards for equipment Technical Manuals. Unlike a civilian "owner's manual" for an appliance or consumer purchased equipment that was developed by the manufacturer with content that might be considered "helpful" to a broad range of potential customers or users, Navy equipment Technical Manuals were developed by the Navy to detailed technical content and format requirements for use by a known audience of Navy-trained shipboard technicians. The purpose of these documents was to provide information specific to the equipment, with a focus on its operation, and avoidance of injuries or accidents that might occur during operation.

59. The purpose of Navy shipboard technical documentation was to provide technical information that could be referenced and understood by the ship's operators if and when needed. Although certainly available to augment Navy training documentation if desired, the shipboard technical documentation was not readily accessible by all personnel, and was not part of the training documentation.

Documentation Regarding Warnings

60. As described above, the content of Navy training documentation focuses on Navy-wide groups of users whereas Navy technical reference documentation is equipment and system specific. Thus, Navy decisions concerning which category of document to include desired warnings and cautions were dependent on the nature of such warnings and caution statements. Warnings and cautions concerning Navy-wide/all-hands subjects such as general shipboard safety, safe driving awareness, hearing loss prevention and later asbestos health warnings were included in readily available and broadly used training documents, some in technical documentation such as Navy rate training manuals, and some in non-technical documentation such as General Military Training syllabuses. Warnings and cautions concerning immediate hazards unique to the operation and maintenance of specific equipment were included in equipment and system specific technical documents such as equipment technical manuals and system level operating manuals which were aimed and available to only limited audiences of personnel directly involved in work on the specific systems or equipment covered by the manuals. Such manuals were not, therefore, appropriate locations for warnings and cautions relating to general or widespread shipboard health issues.

Written Materials Regarding Equipment Supplied to the Navy

61. Technical specifications referenced in the procurement documents for components such as valves and pumps have, since at least the 1940s, included detailed requirements regarding all written materials supplied with valves and pumps. Manufacturers were required to supply drawings and plans, and at times draft technical manuals for equipment. The applicable specifications included strict instructions regarding the labeling of and packaging of the components themselves, and for all technical documentation that was procured with them.

62. To achieve its objective of ensuring that, in form and content, the marking on equipment filled the specific informational role, for the specific Navy audience and environment,

the Navy developed precise specifications as to the nature of any markings, communication or directions affixed to or made a part of any equipment supplied by OEMs for ultimate use aboard Navy ships. Neither OEMs nor equipment or constructing shipyards would have been permitted, under the specifications, associated regulations and procedures, nor under the actual practice as it evolved in the field, to vary or to deviate in any respect from the Navy specifications in supplying equipment, including affixing any type of warning or caution statement to equipment intended for installation in a Navy ship, beyond those specifically required by the Navy without prior discussion and express approval by the Navy.

63. The Navy likewise had precise specifications as to the nature of written materials to be delivered with equipment supplied by OEMs and constructing shipyards to the Navy. This written material included a variety of formats such as design drawings, system schematics as well as operator reference materials to assist the equipment operators in operating, servicing and maintaining such equipment and to assist the Navy training establishment to develop instructional materials and courses. Through specifications, the Navy required that certain equipment be supplied with a defined number of copies of one or more instruction books or technical manuals. The Navy typically developed these technical manuals by including development of a draft manual as part of equipment procurement contracts. The draft manuals were required to be submitted to the Navy for detailed review and feedback. Once the draft manuals were found to be acceptable to the Navy, a BUSHIPS number was assigned and the manual became an official BUSHIPS document the contents of which were controlled by the Navy. The term "manufacturer's instruction books" that is found in many Navy rate training manuals refers to these Navy developed and approved technical manuals.

64. Navy personnel or those of the Navy's Design Agents participated intimately in the preparation and review of these instruction books and technical manuals in a standardized format used by the Navy. These manuals included safety information to the extent – and only to the extent – directed by the Navy. Manufacturers of components and equipment were not permitted, under the specifications, associated regulations and procedures, nor under the actual

practice as it evolved in the field, to include any type of warning or caution statement in instruction books or technical manuals, beyond those required and approved by the Navy without prior discussion and approval by the Navy. The Navy dictated and, itself or through its Design Agents, reviewed and approved the contents of all technical manuals, including any cautionary language or emphasis. The Navy approached this process for review and approval of technical manuals in an exacting manner. It often created lengthy memoranda detailing word-by-word line edits to the content of technical manuals submitted for approval, including the wording of instructional material and warnings. Examples of such correspondence are attached hereto as Exhibit J. Review of and comment upon instructional materials by the Navy's Design Agents was similarly detailed.

65. The reasons for the Navy's detailed control over and review and approval of all written communication regarding equipment it procured was to ensure consistency of that information with the overall goals and priorities of the Navy in its operations. The Navy employed millions of uniformed and civilian personnel aboard thousands of vessels and at hundreds of land-based facilities around the world. The information provided with regard to equipment had to be consistent with the Navy's overall evaluation of the appropriate types and level of information its personnel required to efficiently perform their job responsibilities under a variety of circumstances. In addition, written communications regarding work practices, including safety precautions and equipment, had to be coordinated with the training of Navy personnel, the physical circumstances in which they performed their work, and the tools, protective devices and equipment and other materials available aboard Navy vessels and at Navy installations.

66. Uniformity and standardization of any communication, particularly safety information, are critical to the operation of the Navy and Navy ships. The Navy could simply not operate safely and effectively if personnel were trained differently, or were provided with inconsistent information received from different manufacturers, each left to its own discretion in trying to anticipate the Navy's needs. If every equipment, structural steel and pipe manufacturer

were allowed to decide on the need for, and provide its own safety and health warnings (including those concerning asbestos insulation that might be used on or around its product), inconsistent warnings would certainly have resulted. If each were to warn about all the possible substances that might be used on or around its equipment, sailors would quickly become inundated with inconsistent information on a myriad of substances. Therefore, the Navy's detailed specification of what warnings were required, both on equipment and in technical documentation, was logical and necessary.

67. Asbestos containing materials such as thermal insulation were ubiquitous in Navy shipboard environments. Tens of tons of asbestos-containing insulation were present in mechanical and other spaces aboard Navy vessels. Consistent with its objective to ensure that all documentation to which its personnel were exposed be thoroughly consistent with its overall training and procedures, the Navy would not have permitted equipment suppliers to place asbestos-related warnings on packaging or containers for valves and pumps or related parts or items supplied during the 1940s, 1950s, or 1960s. Similarly, the Navy would not have permitted equipment suppliers to place asbestos-related warnings in any literature or documentations supplied with valves or pumps for Navy ships during the 1940s, 1950s and 1960s.

68. In this regard, it is useful to consider the Bureau of Ships Technical Manual. This manual, prepared by the Navy and updated periodically, was intended to provide guidance and information to Navy personnel on various matters. The Manual contained specific chapters covering numerous topics.

69. A review of examples of Chapter 47 relating to pumps and Chapter 95 relating to gaskets and packing reveals that even when drafting its own manuals governing activities widely known to involve asbestos, the Navy nowhere included any cautionary language regarding – or even any mention of any potential hazards relating to asbestos. In addition, neither Chapter 39 of the BUSHIPS Manual relating to insulation nor Chapter 48 covering piping (and valves) likewise contained reference to such hazards during the 1940s, 1950 and 1960s. Similarly, the Navy's system-level manuals of the type described above likely did not, even where they

pertained to propulsion or other systems on which the Navy required shipbuilders and Navy personnel to install large amounts of asbestos insulation, contain asbestos-related cautions to Navy personnel.

70. The absence of asbestos-related cautionary language in the Navy's own manuals for equipment or for asbestos-containing materials is consistent with the notion that the Navy did not accept, and did not permit, asbestos-related warnings in technical manuals relating to individual pieces of machinery or equipment, and is fully consistent with my experience that such warnings were neither sought nor welcome from manufacturers of such items.

71. Based upon my knowledge of and experience in the design, inspection and procurement of equipment for use on Navy vessels, the Navy would not have permitted equipment suppliers to place asbestos-related warnings on packaging or containers for valves, pumps or related parts or items supplied during the 1940s, 1950s, or 1960s. Similarly, it is also my opinion that the Navy would not have permitted equipment suppliers to place asbestos-related warnings in any literature or documentations supplied with valves or pumps for Navy ships in the 1940s, 1950s and 1960s.

72. The Navy maintained precise Navy Specifications and later Military Specifications that detailed all aspects of label plates that were required on equipment. The Navy and military specifications for identification plates included materials to be used, method of attachment, size of plate, information and format of information required, and many other details to ensure standardization of such plates. The content and format of information that was to appear on those plates was required to be submitted to the Navy for approval. MIL-I-15024 and MIL-I-15024B are examples of such precise military specifications for identification plates, and are attached as Exhibits K and L.

73. I have reviewed and am familiar with the BUSHIPS and later MILSPEC standards for technical manuals, including BUSHIPS General Specifications for Machinery Subsection S-I-1 of 1941 (Exhibit M); and later MILSPECS including MIL-M-15071 (Exhibit N), MIL-M-15071A (Exhibit O), MIL-M-15071B (Exhibit P), MIL-M-15071C (Exhibit Q), and

MIL-M-15071D (Exhibit R). These MILSPECs confirm that the Navy was very specific in detailing what information would be included in these equipment technical manuals. The wording of these documents is consistent with my overall opinion that the Navy intended technical manual text to address operating procedures and related equipment and personnel safety issues specifically associated with the particular equipment to which the technical manual related, rather than to generic occupational health issues. In MIL-M-15071D, adopted in 1961, the Navy included the terms Note, Caution and Warning as possible text in technical manuals. In the section of that MILSPEC that details the requirements for Text to be used, the MILSPEC includes what is termed "Emphasis" language to be used when necessary. It further defines three emphasis terms to be used: "Note", "Caution" and "Warning". The MILSPEC clearly states that these terms will be used sparingly and as adjuncts to text that details operating procedures for the equipment. Thus, these terms could only be included in a technical manual to emphasize specific operating instructions that, if not properly followed, would result in either damage to the equipment or related injury to the operator. The term "Caution" is specified to be used to emphasize an operating procedure that must be followed to prevent damage to the equipment, and the term "Warning" is specified to be used to emphasize a procedure that must be followed to prevent personal injury while operating the equipment. Like both earlier and later versions of the 15071 series, MIL-M-15071D required that all manuals be submitted in draft to the Navy for review and approval prior to finalization and delivery with equipment.

74. It is also my personal experience that the terms "Note", "Caution" and "Warning", when used in Navy equipment technical manuals refer specifically to safe operating and maintenance procedures and not to any more generic health related issues.

Navy Organization

75. Consistent with the sweeping scope of its mission and responsibilities, the Navy is comprised of many different organizations, each of which is specialized in focus, talent and experience. These organizations work together in accomplishing the very complex and unique

sequential efforts from the defining naval war fighting requirements, designing ships and weapon systems that will meet these requirements, and contracting with industry and other government agencies to procure the vast array of required equipment and materials and to construct and test warships. This diverse Navy organization can be described in four major groupings:

-- Secretary of the Navy (SECNAV) and the Chief of Naval Operations (CNO) headquarters staffs (CNO staff is referred to as OPNAV)

-- Operational Fleets

-- Technical Bureaus (now called Systems Commands)

-- Staff Corps (Medical, Dental, Legal, etc.)

<u>SECNAV and CNO Staffs</u>

76. The staffs of Secretary of the Navy (SECNAV) and the Chief of Naval Operations (CNO) are involved in the analysis of national naval war fighting needs, and the development of specific war fighting requirements that must be met. At a top level for warships, these requirements include such things as the types and numbers of ships needed; the capabilities for these ships such as speed, weapons to be installed; types and numbers of aircraft to be embarked; the range and duration at which these ships must be able to operate independently at sea without replenishment; and the reliability of systems that must be guaranteed in order for the Navy to meets its war fighting mission. These staffs are manned by a combination of experienced uniformed Navy personnel with extensive Fleet experience and career civil servants.

<u>Operational Fleets</u>

77. The Operational Fleets are the Navy's war fighters who control and operate the various ships, aircraft, and other equipment in the Navy and Marine Corps. There are several numbered Fleets *(e.g.,* Sixth Fleet, Seventh Fleet) with regional geographic responsibilities around the world. These Operational Fleets have always worked closely with the headquarters staffs in the development of naval warship required capabilities.

Technical Bureaus

78. The Bureau System was established in 1842 to provide the Navy with necessary technical and management control. By the early 1940s, there were six bureaus:

-- Bureau of Naval Yards and Docks

-- Bureau of Ships (BUSHIPS)

-- Bureau of Supplies and Accounts (BUSANDA)

-- Bureau of Ordnance and Hydrography

-- Bureau of Medicine and Surgery

-- Bureau of Aeronautics

79. In the 1950s, a Bureau of Weapons (BUWEPS) was formed by merging the Bureau of Ordnance and the Bureau of Aeronautics. In the 1960s the bureau system evolved several times into what are now called the Systems Commands where BUWEPS was divided into the Naval Air Systems Command and Naval Ordnance Command (NAVORD), and BUSHIPS was divided into the Naval Ship Systems Command (NAVSHIPS) and the Naval Electronics Systems Command. In 1975, another reorganization took place in which NAVSHIPS and NAVORD became the Naval Sea Systems Command (NAVSEA). During this organizational evolution the Bureau of Supplies and Accounts (BUSANDA) became the Naval Supply Systems Command.

Navy Staff Corps

80. The various staff corps of the Navy are comprised of professionals such as doctors, dentists, and lawyers who support all aspects of the Navy in their respective specialties.

81. The Bureau of Medicine & Surgery (BUMED) has always had a very significant role in both the design and operation of Navy warships, in addition to its fundamental role in the overall health and well-being of Navy personnel. All ships have medical facilities integrated into the design, both for normal medical support of the large crews, and for treatment of battle injuries. Small ships such as destroyers have a modest infirmary space and other spaces that can

be converted for medical use while at battle stations. Larger ships have much greater medical capability, with aircraft carriers being fully equipped with several operating rooms for surgery and large hospital wards for sick and wounded personnel.

82. BUMED also plays a very significant role in the operation of Navy ships. BUMED establishes the medical policies and procedures, both preventive and curative, which are utilized on all Navy warships. Additionally, the crew of each warship includes medical personnel who are involved in preventive medicine, crew training, health inspections, and treatment of ailments and injuries. Small ships such as destroyers typically have one highly trained enlisted hospital corpsman assigned, and large ships have both physicians and hospital corpsmen. Aircraft carriers have numerous medical doctors and surgeons with various specialties.

Responsibilities in Warship Design and Construction

83. Responsibilities for the various functions associated with warship design and construction in from the World War II period to the 1970s were as follows:

SECNAV and OPNAV Staffs

84. Working closely with the Operational Fleets and Bureaus, these staffs had the responsibility for defining naval war fighting requirements, developing concepts of operations and ship concepts, and requesting congressional authority and funding to build war ships.

BUSHIPS

85. The Bureau of Ships (BUSHIPS) was comprised of a broad assortment of engineers and technical personnel, and was responsible for all technical aspects of Navy warships. Included were the preliminary designs of ships, the detailed design of ships, subsystems and equipment, and development of the contract design package. BUSHIPS, aided by BUSANDA, had the responsibility to develop the contract design package and the myriad

invitation for bids required to actually procure and construct the ships. All U.S. Naval Shipyards were under the direct command of BUSHIPS, as were the resident Supervisors of Shipbuilding who performed the same government supervisory functions at civilian shipyards. Thus, BUSHIPS was responsible for both the new construction and future repair and overhaul of ships at both naval and private shipyards. BUSHIPS and BUSANDA each had on-site Navy inspectors at various vendors' plants that were responsible for verifying that the vendor complied exactly with all provisions of that vendor's procurement contracts. BUSHIPS was also responsible for the design development of equipment repair and maintenance standards and procedures, and for the development of Navy Specs/MILSPECs that related to ships and ship equipment.

Other Technical Organizations

86. Warships are equipped with many different weapon systems, aviation capabilities, and the accompanying electronic equipment. Therefore, many other Navy and national technical organizations provided support to BUSHIPS in all phases of design and construction. Principal supporting organizations included the Bureau of Ordnance, the Bureau of Aeronautics, and the Naval Electronics Command. Also key in the development and testing of warship propulsion equipment and systems were the National Boiler Test Lab and the Naval Ship System Engineering Station.

BUSANDA

The Bureau of Supplies and Accounts (BUSANDA) was comprised of a variety of professionals with specialties in areas such as government contracting, logistics planning, financial and business management, warehousing and parts distribution management, etc. BUSANDA, in addition to on-site and continuous support of BUSHIPS and other technical bureaus, also provided all Supply Corps officers to the Operational Fleet. The Supply Corps officers were assigned to both ships and Fleet staffs and were responsible for planning and managing all shipboard messing, berthing and spare parts management. BUSANDA was

responsible for maintaining and managing the vast inventory of spare parts, consumables, documentation, and replacement equipment for the Navy.

Pursuant to 28 USC § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 6th day of August 2018.

David P. Sargent, Jr., PE

List of Exhibits:

A. BUREAU OF SHIPS (BUSHIPS) MANUAL CHAPTER 39 - THERMAL INSULATION - 1 April 1947
B. Article "A HEALTH SURVEY OF PIPE COVERING OPERATIONS IN CONSTRUCTING NAVAL VESSELS" – Fleischer/Drinker
C. BUSHIPS TECHNICAL MANUAL CHAPTER 39 – THERMAL INSULATION – 15 April 1959
D. GENERAL SPECIFICATIONS FOR MACHINERY FOR VESSSELS OF THE UNITED STATES NAVY – SECTION S39-2 – 9 December 1951
E. MIL-STD-769(SHIPS) of 13 July 1962 – MILITARY STANDARD THERMAL INSULATION REQUIREMENTS FOR MACHINERY AND PIPING
F. F1 & F2: BUSHIPS USS FLETCHER CLASS INSULATION AND LAGGING SCHEDULE EXTRACTS – BUSHIPS PLAN DD445-S3902 Series
G. BUSHIPS USS SUMNER/GEARING CLASS INSULATION AND LAGGING SCHEDULE EXTRACTS – BUSHIPS PLAN DD692-S3902 Series
H. BUSHIPS USS ESSEX CLASS INSULATION AND LAGGING SCHEDULE EXTRACTS – BUSHIPS PLAN CV-9-S3902 Series
I. DEPT OF NAVY LETTER of 8 February 1979 to U.S. General Accounting Office
J. J1: SUPSHIP CAMDEN 10 March 1942 CL55 Letter and related re CL55 Class DFT Instruction Book; J2: Portsmouth Naval Shipyard 8 June 1959 letter and related re SSN -593 Class LP Distillation Brine Pump Tech Manual;
   J3: SUPSHIP New York 15 June 1966 Letter and related re DE1052 Distiller Feed Pump Tech Manual
K. MIL-I-15024(SHIPS) of 19 September 1952 – INTERIM MILITARY SPECIFICATION, PLATES, IDENTIFICATION PLATES, INFORMATION PLATES AND MARKING INFORMATION FOR IDENTIFICATION OF ELECTRICAL, ELECTRONIC AND MECHANICAL EQUIPMENT
L. MIL-I-15024B(SHIPS) of 5 November 1956 – MILITARY SPECIFICATION, PLATES, IDENTIFICATION-INFORMATION AND MARKING FOR IDENTIFICATION OF ELECTRICAL, ELECTRONIC AND MECHANICAL EQUIPMENT
M. GENERAL SPECIFICATIONS FOR MACHINERY BUSHIPS – SUBSECTION S1-1. PLANS – 1 March 1941
N. MIL-M-15071(SHIPS) of 1 April 1950 – MILITARY SPECIFICATION, BOOKS, INSTRUCTION; PREPARATION, CONTENTS, AND APPROVAL
O. MIL-M-15071A(SHIPS) of 20 October 1952 – INTERIM MILITARY SPECIFICATION, BOOK, INSTRUCTION, PREPARATION, CONTENTS AND APPROVAL
P. MIL-M-15071B(SHIPS) of 16 August 1954 – MILITARY SPECIFICATION, TECHNICAL MANUALS FOR MECHANICAL AND ELECTRICAL EQUIPMENT
Q. MIL-M-15071C(SHIPS) of 10 September 1957) - MILITARY SPECIFICATION, TECHNICAL MANUALS FOR MECHANICAL AND ELECTRICAL EQUIPMENT (LESS ELECTRONICS)
R. MIL-M-15071D(SHIPS) of 6 June 1961 – MILITARY SPECIFICATION, MANUAL, SERVICE (INSTRUCITON BOOKS) FOR SHIPBOARD ELECTRICAL AND MECHANICAL EQUIPMENT